REMARKS

Claims 3, 9-15, 19-24, 27, and 33-39, 43-68 are pending in the application, of which Claims 15, 39, 49, and 54 are independent claims. All Claims stand rejected under 35 U.S.C. § 103(a) based on U.S. Patent No. 5,988,165 to Richey II, et al. in view of U.S. Patent No. 6,068,448 to Muratsubaki et al. In addition, Claims 11, 21, 35, and 45 stand rejected under 35 U.S.C. § 112, second paragraph, and Claims 39 and 54 have been objected to. In response, certain claims are amended to clarify the claimed invention.

Regarding Objections

Claims 39 and 54 have been objected due to an informality. As noted by the Examiner, the Claims did not properly recite a piston chamber. The claims have been amended to cure the defect.

Withdrawal of the objection is respectfully requested.

Regarding Rejections Under Section 112

Claims 11, 21, 35, and 45 stand rejected under 35 U.S.C. § 112, second paragraph, for lacking an antecedent basis to support "a second sensor" limitation. In response, the dependencies have been amended to cure the defect.

Reconsideration of the rejections under 35 U.S.C. § 112 is respectfully requested.

Regarding Rejections Under Section 103

Claims 3, 9-15, 19-24, 27, 33-39, and 43-68 stand rejected under 35 U.S.C. § 103(a) based on U.S. Patent No. 5,988,165 to Richey II, et al. in view of U.S. Patent No. 6,068,448 to Muratsubaki et al.

Before discussing the cited references, a brief summary of the claimed invention may be helpful. The Applicants disclose and claim a multi-stage compressor having a ball screw drive. As a multi-stage compressor, there are at least two piston chambers, each having a different volume. When fluid in a first piston chamber is compressed, it flows to a second piston chamber having a smaller volume, where it is further compressed. The two pistons are directly connected by a threaded connecting member and a ball-screw drive is engaged with the threaded member.

A reversible motor under control of a controller rotates the ball screw nut to cause reciprocating linear translation of the connecting member and pistons.

In a particular embodiment, as shown in FIG. 1, the compressor is disposed between an oxygen concentrator and a portable oxygen storage tank. The use of an oxygen concentrator as an input source means that it may take time to fill the first piston chamber with oxygen. To solve that problem, the controller does not begin a piston cycle until gas with the first chamber reaches a predetermined pressure, as reported by a first pressure sensor. In addition, the rotational speed of the motor can vary during a piston cycle, such as by ramping up at the beginning of a stroke and then ramping down at the end of the stroke.

Richey discusses a system for compressing oxygen-enriched gas. According to Richey, a multi-stage compressor is used to compress oxygen-enriched gas from a low-pressure buffer tank into a high-pressure storage vessel. In particular, Richey discusses a three-stage belt-driven compressor, where three pistons are actuated by a crankshaft. The compressor is driven by an electrical motor and reduction belts are used to reduce the rotational speed of the crank shaft to approximately 50 rpm.

Richey does include a pressure sensor at the input stage from the buffer tank. If the buffer tank falls below a predetermined pressure, then the motor is turned off. Similarly, if the pressure in the storage vessel exceeds a predetermined pressure, the motor is turned off. In other words, the Richey motor either runs at about 50 rpm or it does not run at all.

Muratsubaki discusses a pressure hydraulic pump that includes two-stages of plunger pumps driven by a ball-screw drive system. In operation, fluid is sucked into the first stage pump from a fluid reservoir. The first stage pump boosts the fluid pressure to an intermediate pressure. That fluid is sucked into the second stage pump, where its pressure is further boosted before being expelled to a load vessel or hose nozzle.

The Office Action combines Richey and Muratsubaki. In effect, the Office Action replaces the Richey compressor with the Muratsubaki compressor, while keeping some features of the Richey compressor. For example, while the Richey compressor turns on and off depending on the input and output pressures, Muratsubaki does not.

In any event, neither reference teaches or suggests a variable speed motor. As such, the amended claims distinguish over Richey and Muratsubaki, either alone or in combination, and are now believed to be in condition for allowance.

The dependent claims recite additional patentable subject matter. The allowability of the dependent claims follows from the allowability of the independent claims from which they depend. Because each independent claim should now be allowable, the dependent claims should also be allowable.

Reconsideration of the rejections under 35 U.S.C. § 103(a) is respectfully requested.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

R.D. Johnson & Associates, P.C.

By /Rodney D. Johnson/
Rodney D. Johnson
Registration No. 36,558
Telephone: (781) 444-6844
Facsimile: (617) 412-3081

Dated: March 22, 2010